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A NEW GENUS AND SPECIES OF THE COLLEMACEAE¹

BRUCE FINK

(WITH PLATE 13)

In 1912 and 1913 (1 and 2), Freda M. Bachman published two papers in which a new form of male reproductive tract and a peculiar behavior of the trichogyne were described. During the progress of Miss Bachman's investigations, the writer had her material under observation several times and was convinced that she was working on the classical *Collema pulposum* (Bern.) Ach., until the sexual reproductive tracts and their behavior had proved to be very different from those known to exist in that lichen (Cf. pl. 13, f. 1, 2, 3, and 4, with f. 5 and 6, with respect to size and manner of occurrence).

When we recall that, in these lichens imbedded in gelatinous *Nostoc* colonies, we see with the eye only the modified algal-host colonies in which the lichen lives and the fruit of the lichen, and that the apothecia and the spores are much alike in several different species of the Collemaceae, it does not seem strange that two lichens, perfectly distinct with respect to sex organs and their behavior, should have very similar apothecia and spores, and should produce very similar modifications of the algal-host colonies. But this does not justify placing plants with very different types of male reproductive tracts and corresponding difference in the behavior of the female reproductive tracts in the same genus and species.

During the years 1912 to 1915, when the writer and Miss C. Audrey Richards were at work on the Collemaceae of Ohio (3), Miss Richards, who was doing the microscopic work, found the peculiar male reproductive tracts several times in material which we had previously taken for *Collema pulposum* (Bernh.) Ach. The lichen just mentioned was also found frequently in the speci-

¹ Contributions from the Botanical Laboratory of Miami University.—XIV.

mens studied, and the similar effect produced on the algal host by the two lichens, together with their similarity with respect to apothecia and spores, led to the suspicion that the plants might after all belong to the same species, the internal spermatia being conidia, with which the trichogynes fused in some instances instead of with the spermatia produced in spermagonia. Though this possibility was kept in mind in the examination of material, in no instance were spermagonia and the free internal spermatia found on the same plants, or in plants belonging to the same collection.

Before studying the Ohio material, it had been ascertained that the material widely distributed by the writer from Fayette, Iowa, in 1894 and following years, as *Collema pulposum* (Bernh.) Ach. was not that lichen but the new and peculiar one studied first by Miss Bachman and described in the present paper. After working on the Ohio material, the specimens in the writer's herbarium were gone over with the result that the new plant was found from widely separate stations, extending from the Atlantic coast to areas west of the Mississippi River.

On account of the similar modification of the algal-host colony and the likeness with respect to apothecia and spores between the plant described below and certain species of *Collema*, especially *Collema pulposum* (Bernh.) Ach., one can never hope to make sure whether he has our plant or a *Collema*, without ascertaining the morphology of the male reproductive tract, and the behavior of both male and female reproductive tracts. In these respects it must be remembered that our plant has internal, much larger spermatia, not contained in spermagonia and that the trichogynes grow to the spermatia within the thallus; while in the *Collemae* the trichogyne extends above the surface of the thallus, and the much smaller spermatia escape from the superficial spermagonia and are carried to this exposed portion of the female reproductive tract.

Collemodes gen. nov.

Transforming the algal-host colonies into foliose bodies; thallus wholly mycelial, imbedded in the host colonies, and attached to the substratum by rhizoids; male reproductive organs not in

spermagonia, but occurring internally in groups of several individuals (pl. 13, f. 2, 3, and 4).

Collemodes Bachmanianum sp. nov.

Transforming the algal-host colony into a middle-sized, orbicular or irregular body, which is 1.4 to 7 cm. across and 375 to 850 mic. thick, and closely attached to the substratum, with entire or repand crenate, often imbricate lobes, which are olive varying toward blue or black and scarcely lighter below, the marginal ones often with strongly ascending or even erect borders, while the central ones are usually flat, and with the algal-host colonies more numerous toward the surfaces; thallus of variously disposed hyphae, more densely placed under and about the apothecia where they are straight or wavy and usually stand roughly perpendicular to the disk; rhizoids many and for most part disposed in groups at the various points of attachment to the substratum; ascogonia occurring singly or in groups of 2 to 4 from 100 to 160 mic. below the upper surface of the thallus, each ascogonium of 2 to 4 coils, which contain 6 to 12 cells (pl. 13, f. 1 and 4); the trichogynes passing in various directions (pl. 13, f. 1 and 4) usually toward groups of internal spermatia; spermatia commonly found in groups of 3 to 15, and 100 to 300 mic. below the upper surface of the thallus, the groups arranged on the sides or the ends of small and often irregular hyphae, the spermatium oblong-clavate, 6 to 14 mic. long and 2 to 3 mic. wide; apothecia many, adnate or sessile, scattered or thickly disposed over the central portion of the thallus, 0.5 to 4.5 mm. across; disk red-brown, concave or rarely becoming flat or slightly convex, surrounded by an entire or a rugose-crenate thalliod margin, which extends slightly above the disk; exciple thin, composed of interwoven hyphae, hyaline or light-brown; hypothecium hyaline to light-brown, composed of interwoven hyphae, 45 to 80 mic. thick; hymenium hyaline below to brown above, 135 to 165 mic. thick; asci cylindrico-clavate, 100 to 120 mic. long and 20 to 30 mic. wide; spores hyaline, ellipsoid, muriform, longitudinally 4 to 5-celled and transversely 1 to 2-celled, 8 in each ascus.

Examined from Iowa (Fink), Minnesota (Fink), Wisconsin

(Bachman), Ohio (Fink), Missouri (Russell), and New York (Burnham).

The writer is under obligations to his former pupil, Miss C. Audrey Richards, for the drawings which accompany this paper.

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EXPLANATION OF PLATE 13

Fig. 1. An archicarp of *Collemodes Bachmanianum*, the trichogyne of which extended roughly parallel with the surfaces of the thallus. $\times 580$.

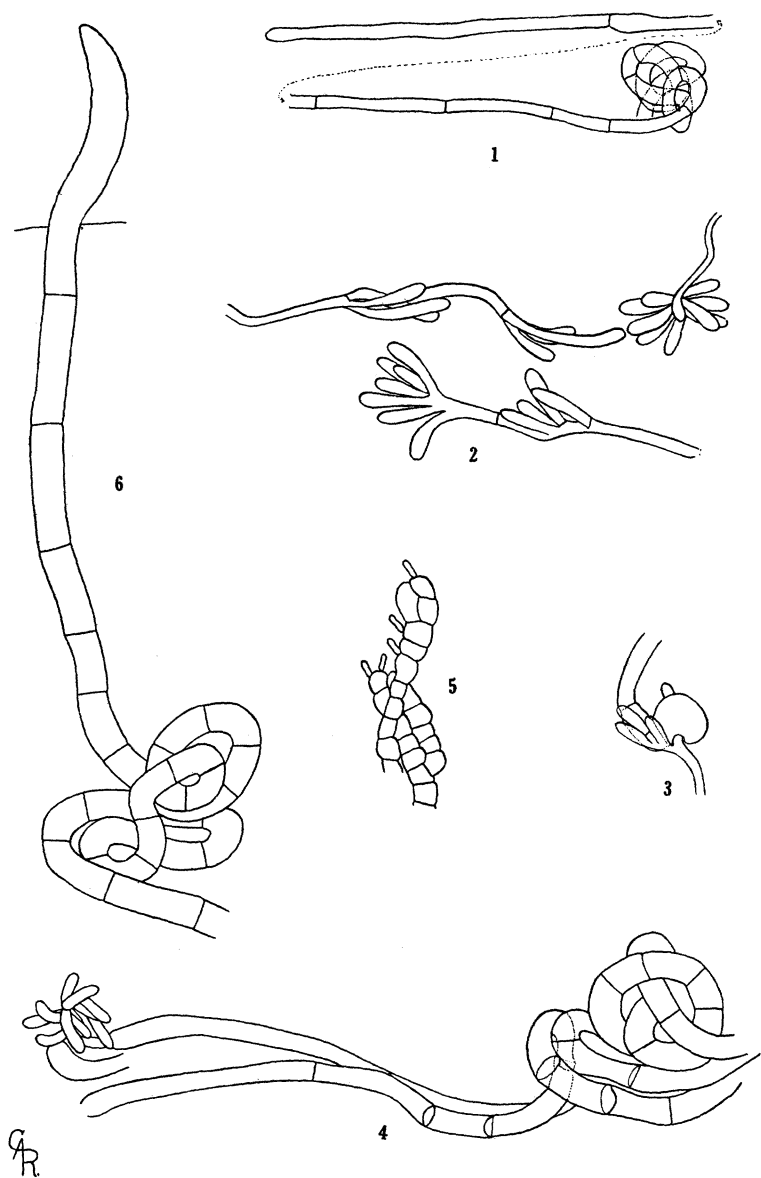
Fig. 2. Several groups of internal spermatia of *Collemodes Bachmanianum*, with the hyphae upon which they are borne. $\times 1,000$.

Fig. 3. A group of four internal spermatia of *Collemodes Bachmanianum* with the swollen tip of a trichogyne applied to one of them. $\times 1,000$.

Fig. 4. Two ascogonia of *Collemodes Bachmanianum* at the right, and two trichogynes extending toward a group of internal spermatia. $\times 1,000$.

Fig. 5. Portions of three basidia of *Collema pulposum* with five spermatia attached. $\times 1,000$.

Fig. 6. An archicarp of *Collema pulposum*, the trichogyne of which extends above the thallus. $\times 1,000$.



FIGS. 1-4. COLLEMODES BACHMANIANUM FINK
FIGS. 5, 6. COLLEMA PULPOSUM (BERNH.) ACH.